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ABSTRACT
        Social relations data is an especially useful but
often neglected means of obtaining information on the effects of
social processes that are involved in educational interventions. A
four-fold table conceptualizes educational interventions and their
outcomes as consisting of social and academic interventions and their
outcomes. This model characterizes programmatic interventions as a
mechanism for changing opportunities and making interaction more or
less convenient. The model is applied to evaluation of two nationwide
policies that call for social intervention in public education:
racial desegregation and the mainstreaming of mildly handicapped
children. In the case of desegregation, data include numerical levels
of desegregation, the level of effort, and the repeated measures of
social interaction. The outcome noted is the level of integration
across various settings. The optimum process for developing data on
social outcomes is sociometric testing. (LP)

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THE EVALUATION OF SOCIAL OUTCOMES IN EDUCATION

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2

16

The Evaluation of Social Outcomes in Education[1]

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Introduction

Educational interventions are usually expected to affect the cognitive performance of individuals regardless of whether the intervention involves social or cognitive processes. As a consequence, educational evaluations tend to stress the differential impact of cognitive and social processes on cognitive outcomes. The relative neglect of social outcomes, whether purposeful or accidental, is unfortunate because it results in continuing uncertainty regarding the utility of alternative strategies for achieving the social goals of public policies. There are two basic reasons for this situation: (a) well-specified models that relate social processes to measurable policy-relevant outcomes are rarely proposed; and (b) appropriate measurement techniques and analytic tools that focus on social variables are inadequate. In this chapter we describe a conceptual framework that can aid in clarifying distinctions between social and cognitive outcomes; we explore some possible models for social interventions that follow from this framework, and we detail an analytic strategy that can improve precision in measuring social outcomes. We apply this approach to two

social interventions: *(a)* racial or ethnic integration; and (*b*) the mainstreaming of "special" children. Finally, we demonstrate the use of the analytic strategy through the presentation of results from an evaluation of a mainstreaming experiment.

Although this oversimplifies the situation, it is helpful to conceptualize educational interventions and their concomitant outcomes as a four-fold table consisting of academic and social interventions and outcomes. For example, academic manipulations can be designed to alter the academic behaviors of students (Case 1 in Figure 16.1), as in the introduction of a new curriculum or instructional technique (Ball 1973). Student social behavior can be manipulated with the purpose of altering academic behavior (Case 2), for example, the teams-games tournaments developed by Slavin (1978) and others. Less often, academic behavior is manipulated in order to alter student social behavior (Case 3), as, for example, in the work of Cohen, Lockheed, and Lohman (1976) on expectations in desegregation contexts. Finally, social behavior can be programmatically altered with the objective of changing the voluntary social behaviors of the students (Case 4). Desegregation and mainstreaming are examples of such interventions. Although any academic intervention can have social consequences and vice versa, we concentrate here on Case 4, social interventions designed to have social consequences.

In general, when evaluators investigate outcomes of academic interventions they usually proceed by administering a battery of achievement (academic) and attitude (social) tests (Cooley and Leinhardt 1980; Fisher, Filby, Marliave, Cahen, Dishaw, Moore, and Berliner 1978; Stebbins, St. Pierre, Proper, Anderson, and Creva 1977) but the discussion of results almost always focuses on the achievement tests alone. Clearly, education involves more than academic achievement, and loud complaints about narrowness and rigidity in evaluating programs using achievement tests alone are frequently heard. Such approaches are, however, unlikely to be abandoned (House, Glass, McLean, and Walker 1978). Indeed, when affective or noncognitive outcomes are reported, it is very frequently because nothing could be said about the academic outcomes, and we are left with the unsatisfying "happy, self-confident, but ignorant student" syndrome that plagues many evaluations (Webster 1975). Inadequate attention to the social outcomes of social interventions raises a serious problem for applied social science.

The apparent neglect of the social consequences of social interventions is surprising for several reasons. First, it is acknowledged that the educational process influences the development of social behaviors and competencies in addition to academic achievement (Cohen *et al.* 1976). Second, there is growing evidence that peer processes are an important mediator of academic learning and can, through the establishment of communication and support networks, facilitate or frustrate the acquisition of both academic and nonacademic skills (Bar-Tal 1978). Third, the phenomenon of self-imposed segrega-

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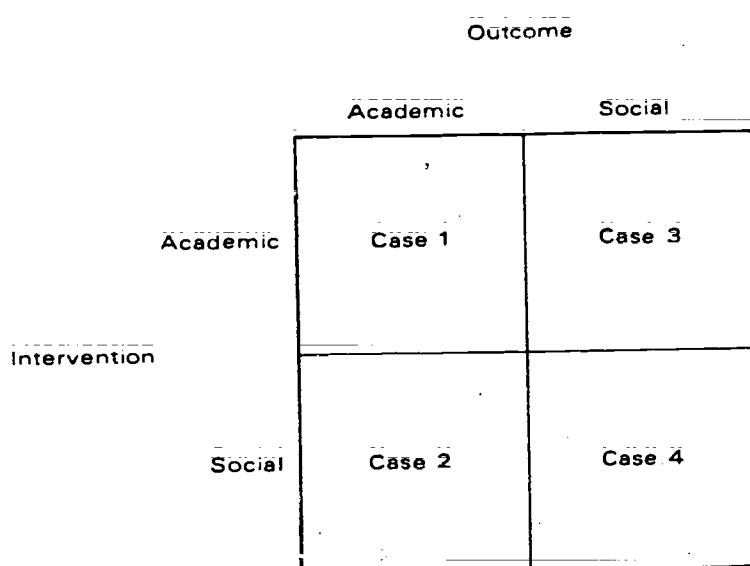
Outcome

FIGURE 16.1. *This chart relates academic and social interventions and outcomes.*

tion of minorities within programmatically desegregated schools implies that it is possible for the letter but not the intent of the law to be fulfilled (Francis and Schofield 1980), and, therefore, that procedures are needed that can assure greater compliance.

Two Social Interventions

In the United States there are two nationwide policies that call for systematic social interventions in public education which are the focus of numerous evaluations: racial desegregation and the mainstreaming of mildly handicapped children. These policies are rooted in parallel interpretations of the constitutional requirement for equality of all before the law. Both have led to programmatic manipulations in which personal attributes of children are used as a basis for locating them in various educational facilities. In the case of desegregation, the relevant attribute is race, and by extension, ethnicity; in mainstreaming, it is a physical or mental impairment. Both programs, now established policies, have been the fruit of elaborate and costly historic trends and are still a cause of continuing public and institutional concern.

The eradication of de jure segregation following the 1954 Supreme Court decision (*Brown* v. *Board of Education*) was, relatively speaking,

straightforward.[2] The eradication of de facto segregation, on the other hand, since it involves the development and implementation of new and untried social mechanisms for overcoming the natural consequences of established residential, attitudinal, occupational, and instructional patterns, is far more complicated and has led to the development of numerous intervention strategies. These strategies can be designed to achieve various legal or politically specified levels of racial balance. They also tend to have varying impacts on the targeted individuals as well as on the community. In part, different implementation strategies exist because policymakers lack adequate information on the nature of their indirect impacts.

DESEGREGATION AND INTEGRATION

Simple desegregation; the physical presence of different categories of individuals; can and should be evaluated in a relatively straightforward manner. For the most part, such physical manipulation is a precondition to social integration and equality of opportunity; but it is not the same thing. Physical desegregation can occur at a variety of levels: the community; the school system, the school building; the grade or class type (i.e., remedial; vocational; general, academic); the classroom, or the instructional unit. It is achieved by simply placing individuals of a particular type in the presence of individuals of a different type. Legal mechanisms exist through which to obtain such mixes.[3] However, when we turn to issues of integration (the positive social interaction of the relevant groups), we face the problem of changing the voluntary behavior of individuals, a problem which is beyond the sphere of mandatory actions. The information we need to determine whether integration occurs is also signficantly more complex. It includes contextual information, the relative status of those contexts, the desegregation level in each, and the nature of the intergroup ties or contacts that occur in each situation.

Regardless of whether the objective of a desegregation attempt is simply desegregation or the more elusive integration, the evaluative model that has frequently been employed, although complex, has not been well specified. It is assumed that the simultaneous physical presence of minority and majority

[2] We do not mean to imply that it was simple or easy. We merely point out that, once a construct is developed in law, there are established procedures for effecting a specific outcome.

[3] A worthwhile piece of evaluative information would be the very simple documentation of this alone. For example, in 1980, the city of Pittsburgh was 22% black; the school system was 50% black. The top academic high school was 25.7% black, ninth grade was 32% black, twelfth grade was 25% black, remedial programs were 70% black, academic programs were 18% black, honors programs were 10% black; and so forth. The academically lowest high school was 99.8% black, ninth grade was 99.9% black, twelfth grade was 100% black, remedial programs were 100% black, academic programs did not exist, nor did honors programs. These nested lists of simple percentages are informative and suggest clear lines of dramatic status differentials and areas in which policy workers can and are placing their efforts.

children will. through some unspecified process. lead to an improvement in the academic performance of the minority group while leaving the academic performance of the majority group unchanged. Although there seems to be little information to support the former assumption. there is some substantial information to support the latter (Crain and Mahard 1977). Does this mean that desegregation is a failure? We would argue that the model is misguided and leads to irrelevant evaluations. The concern should focus on the social outcomes of desegregation and the mechanisms through which the social ties that permit integration to develop.

CONCEPTUAL MODELS

Developing conceptual models of the processes that are thought to link interventions with outcomes is an important part of an evaluation. By *conceptual model* we mean simply a relational schema. or graph, in which measurable inputs are linked to observable outcomes. Such a model helps the evaluator specify the processes through which inputs are expected to affect target individuals and alter *observable* behavior. This activity forces the evaluator to be explicit about what aspects of the intervention are expected to influence the behavior of target individuals. and to what extent specific measures are acting as proxies for the elements of concern (Cooley 1978; Leinhardt 1978; Leinhardt 1980). When the evaluation focuses on academic outcomes. the use of such an approach is not novel. It does seem far less accepted. however. when social outcomes are at issue. It is quite likely that two problems are involved. One is the paucity of applicable social science theory and the other is the lack of agreement on what are observable social outcomes.

Social science theory could be a vital aid in the construction of conceptual models. The ory can suggest the components. relationships. and directionality of impacts. Further. it can help evaluators recognize when apparently different components are in fact the same. By constructing conceptual models. the evaluator. in effect, translates theory into the client's policy-relevant dimensions. Unfortunately. most relevant theoretical social science is devoid of operational implications. Consequently. the evaluator is in a position of either neglecting theory altogether and proceeding in an ad hoc fashion. or creating a theoretical framework. We choose this latter approach. but do so in a general fashion in order to establish a framework that has broad-based applicability in contexts where behavioral manipulations are designed to yield social outcomes.

In developing the models for social interventions used here. we have utilized what we call an opportunities framework as a theoretical guide. Specifically. we assume that social interventions alter individuals' opportunities for socially meaningful encounters. Successful integration of minorities and the handi-

7

capped, thus, depends in part on the opportunities for contact provided by the context. We distinguish between *passive* opportunities in which targets may observe interactions and may experience primarily cognitive alterations or confirmations, and *active* opportunities in which the targets may encounter (physically or verbally) or interact with the "others." The metric for both active and passive opportunities involves time as well as quality or significance. We are asserting that, for evaluative purposes, social interventions can best be understood in terms of the alterations in opportunities which they create for target individuals to experience passive and active social encounters which would not have occurred or would have been significantly less likely without the intervention.

Using the opportunities framework, a useful model for the impact of desegregation can be specified. The outcome of interest is the level of integration across a variety of settings, such as, athletics, subject matter, free time. The inputs of interest are the numerical levels of desegregation, the level of effort or intervention, and the repeated measures of social interactions. The point here is that desegregation is primarily a social event. The objective is to alter the social experience and behavior of individuals and promote a view of a socially moral and ethical society.

SOCIAL OUTCOMES

Before discussing specific models of integration we need to clarify what we mean by a social outcome. We have asserted that social outcomes must be conceptualized in terms of observable social behaviors. Educational interventions involve manipulations of individuals that manifestly alter the opportunities they experience for social interaction. Such interaction or its observation is presumed to affect the development of relations between individuals. Thus, social outcomes can be measured in terms of either the actual interactive behavior of targeted individuals or the relational ties that exist between them.

Desegregation and mainstreaming create increased opportunities for interaction between members of different groups; that is, between individuals of different races or ethnicities, and between individuals who are handicapped and those who are not. Although usually described categorically, for example, as interaction between the races or between special and regular groups, each interaction involves individuals and is associated with interpersonal relations to and from them. Such interactions may have positive or negative impacts on the desire of the interacting individuals to engage in similar future interactions with the same or similar types of individuals. Observation of altered opportunities, actual interaction, and the development of interpersonal ties are straightforward. For example, we can conceptualize interventions that are designed to alter expectations, encourage interdependence, and promote physical proximity

8

as attempts to foster interaction by making it more convenient and even necessary.

Successful integration should lead to stable patterns of relational ties that are indifferent to race or ethnicity, and the ties can serve as an observable outcome. As Cohen (1975) argues, a successfully integrated classroom within a desegregated school need not be a mass of completely affectively interconnected individuals. Successful integration occurs when contacts between members of different social groups are nearly as likely to lead to repeated contacts and lasting affective ties as are contacts between members of the same social group. In Cohen's (1975) words,

> The mechanism of desegregation is not intended to create universal love and brotherhood. The goal of the desegregation process is a *reasonable* degree of social integration and a lack of overt conflict whereby blacks and whites, given an objective important to both, can *trust* each other and listen to each other sufficiently well to complete the task at hand, whether it be a vocational task, an educational task, or a political task [p. 273; emphasis added].

The objective in the case of mainstreaming is analogous. No one presumes that the handicapped child will be universally admired, liked, or loved. The objective is for the child to obtain the same level of integration within the group that could be obtained by nonhandicapped children. Social indifference is the goal, that is, the probability of interaction between two dissimilar individuals should be essentially the same as the probability of interaction between two similar individuals. Integration for the handicapped child means that he or she is not universally disliked, rejected, or hated simply because of a handicap. Patterns of interpersonal ties, thus, become a metric against which to ascertain how successful integration has been.

Figure 16.2 displays a possible model for integration which possesses observable social outcomes related to programmatically manipulable opportunities. The model contains features that are important but ignored in most evaluations. Racial integration (11) is a consequence of the quantity and quality of social contacts between the members of two groups, A and B (10). The social contact can be observed directly, inferred from the structural analysis of sociometric responses, or inferred from unlinked self-reports. The quantity and quality of social contacts are a function of the temporal opportunity (6) (controlled for contexts), the physical arrangement or groupings (7), the degree to which both groups engage in similarly liked and disliked tasks and to which both groups have publicly and privately shown to have similar success (8), and finally, teacher treatment (9) of the individual members of the groups in terms of instruction, management, "fairness," and physical arrangement of the instructional setting.

Temporal opportunity and physical arrangement are in part functions of the level of desegregation (5) and the group structure immediately following

Predesegregation   Desegregation   Postdesegregation

Temporal
opportunity
for interaction
⑥

Level of
desegregation
⑤

Group A
social
structure ①

Attitudes
toward:
A, B, and
desegregation ③

Social contact
and structure
④

Physical
arragement ⑦

Social contact
and structure
⑩

Racial
integration ⑪

Group B
social
structure ②

Task
similarity
and success ⑧

Teacher
treatment ⑨
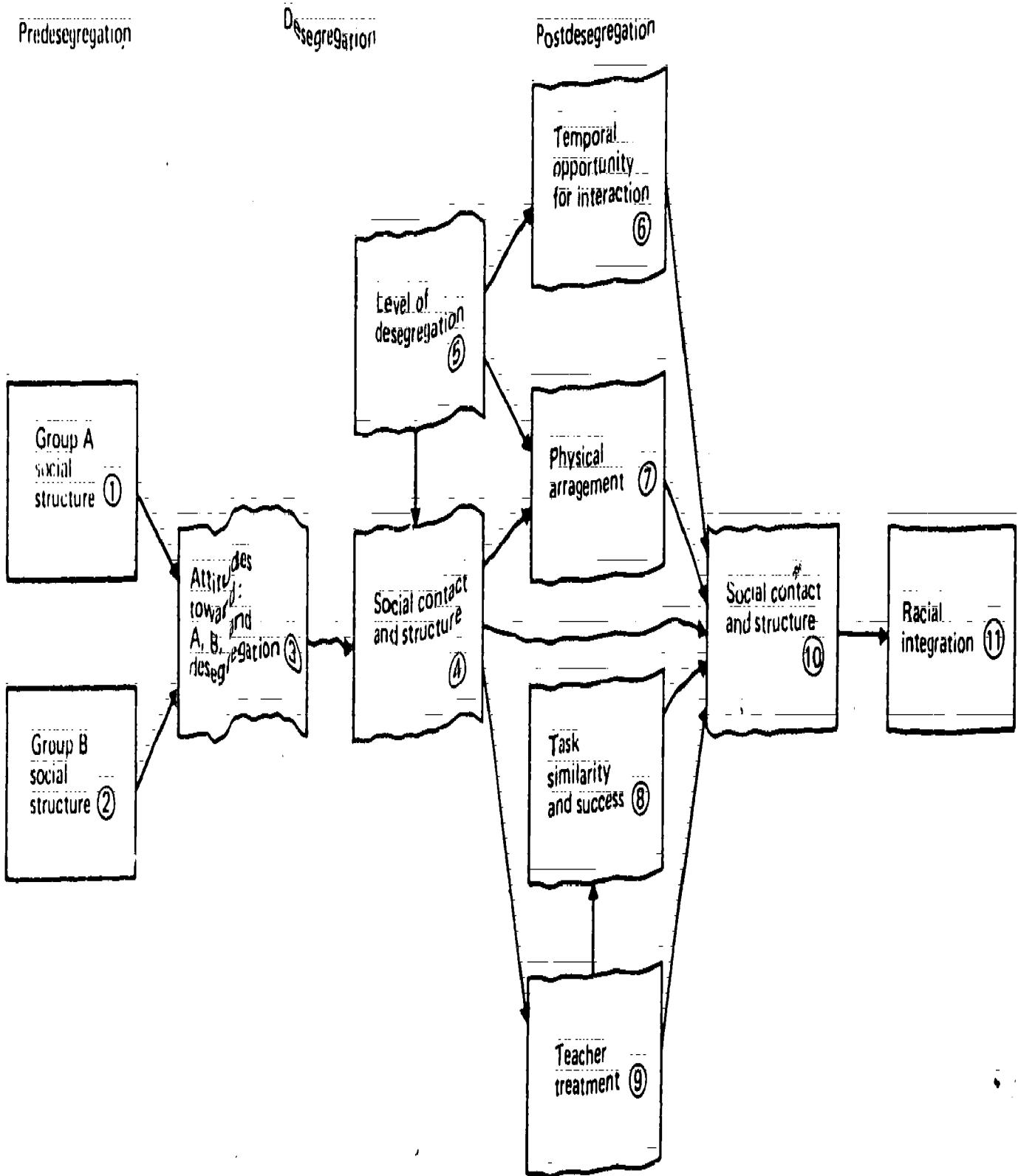
FIGURE 16.2. This model shows processes influencing integration.

desegregation (4). Group structure immediately following desegregation is a function of the attitudes (3) of both groups (toward themselves, others, and desegregation) and the structures from which the individuals emerged (1 and 2). This models assumes that major interventions designed to affect integration operate through the elements we have specified. Thus, Cohen's work on expectation alteration works on opportunity for contact (6) and task skill performance (8). In the absence of such efforts, the pattern of quick resegregation and reduction of social contact—especially prosocial contact—is well documented (Cohen 1975, Rist 1979, Schoefield 1978, Schoefield and McGivern 1979).

What role does such a model play in an evaluation? The evaluation model we are proposing is designed to assess the impact of desegregation on intergroup relations. We are arguing that one must be explicit about what things influence such relationships. A useful evaluation is one that provides information relating level of impact to manipulable features of the educational environment and also indicates which elements have positive but compensating features and can be ignored. For example, if Cohen and Lockheed are right, then simply manipulating temporal opportunity and task success in the right way can have profound consequences for social contact and integration, consequences sufficient, perhaps, to overcome or alter attitudinal states or initial group structures. On the other hand, if they are not right then such appealingly simple manipulations are not sufficient and more complex mediations are required.

MAINSTREAMING OF MILDLY HANDICAPPED CHILDREN

Mainstreaming is another educational intervention possessing a significant social outcome that has become national policy in the United States. The policy results from the passage by Congress of the "Education for All the Handicapped Children Act" in 1975 (PL 94-142). By requiring that all children be educated in the "least restrictive environment," this act, in effect, mandated the elimination of programs in which mildly handicapped children receive separate special education. Mainstreaming, like desegregation, involves physically locating one group of students, the handicapped, in the same educational context as another, the nonhandicapped. There are, however, two important differences between mainstreaming and desegregation. One involves the quite small number of children who are to be mainstreamed. The proportion of minority students who are to be integrated into United States public schools is about 30% of all children. Handicapped children make up about 12% of all children: those that are mildly handicapped and, therefore, likely to be mainstreamed, represent only about one-half of this or 6%. The density of mainstreamed children is so low that regular classrooms would contain at most two special children and rarely more than one. Thus, the dominant social

11

system in mainstreamed classrooms is likely to remain that of the normal children.

The second difference involves the effective absence of a minority subculture of handicappedness (with the exception of the hearing-impaired). In addition, the values and attitudes of the society at large are the values and attitudes that teachers, policymakers, and parents by and large agree should be those acquired by the mainstreamed child. Indeed, proponents of mainstreaming freely admit that improved access to these values and attitudes is an important underlying rationale for mainstreaming.

The move toward mainstreaming has both academic and social components, and evaluations have evidenced these dual concerns. Evaluations of academic outcomes in mainstreaming contexts are motivated by two distinct points of view. One is the realization by special educators themselves that the use of separate facilities is *not* an effective academic mode for most children with special needs (Dunn 1968). This leads naturally to a need for evaluators to determine whether children with special needs perform at least as well in mainstream classrooms. The other point of view leads to a focus on the academic performance of normal children who share their academic experiences with a mainstreamed special child. Here the concern is that their achievement is no poorer as a consequence of the intervention.

Evaluations of the social outcomes of mainstreaming have been relatively common. Since the density of special children in mainstream classrooms is small on average, the attitudinal and behavioral reaction of the normal children to the insertion of a handicapped child into the classroom social system becomes a critical issue. If there is only one special child in a class, the archetypical situation, lack of social integration implies utter isolation. In contrast to the situation in a desegregated school where blacks and whites may voluntarily resegregate and develop parallel independent social systems, a socially isolated mainstreamed child is effectively excluded from all peer-based social activities and, as a consequence, except for the opportunity to observe normal children, has no opportunity to develop the attitudes, behavioral skills, and social expectations that immersion in the normal classroom is supposed to provide (Chaires 1966).

Because of the ease with which isolation can be observed and its evident deleterious consequences, numerous procedures have been developed to improve the chances a mainstreamed child has to develop interpersonal ties with normal classmates. The design of evaluation strategies for these procedures depends upon the conceptual model the evaluator has of the mainstreaming process.

Our model derives from the opportunities framework. As with desegregation, the point is to specify in some detail the processes that affect the level of social integration on an individual and lead to mechanisms for measuring these conditions. Our model is presented in Figure 16.3. It is very similar to that proposed for desegregation.

12
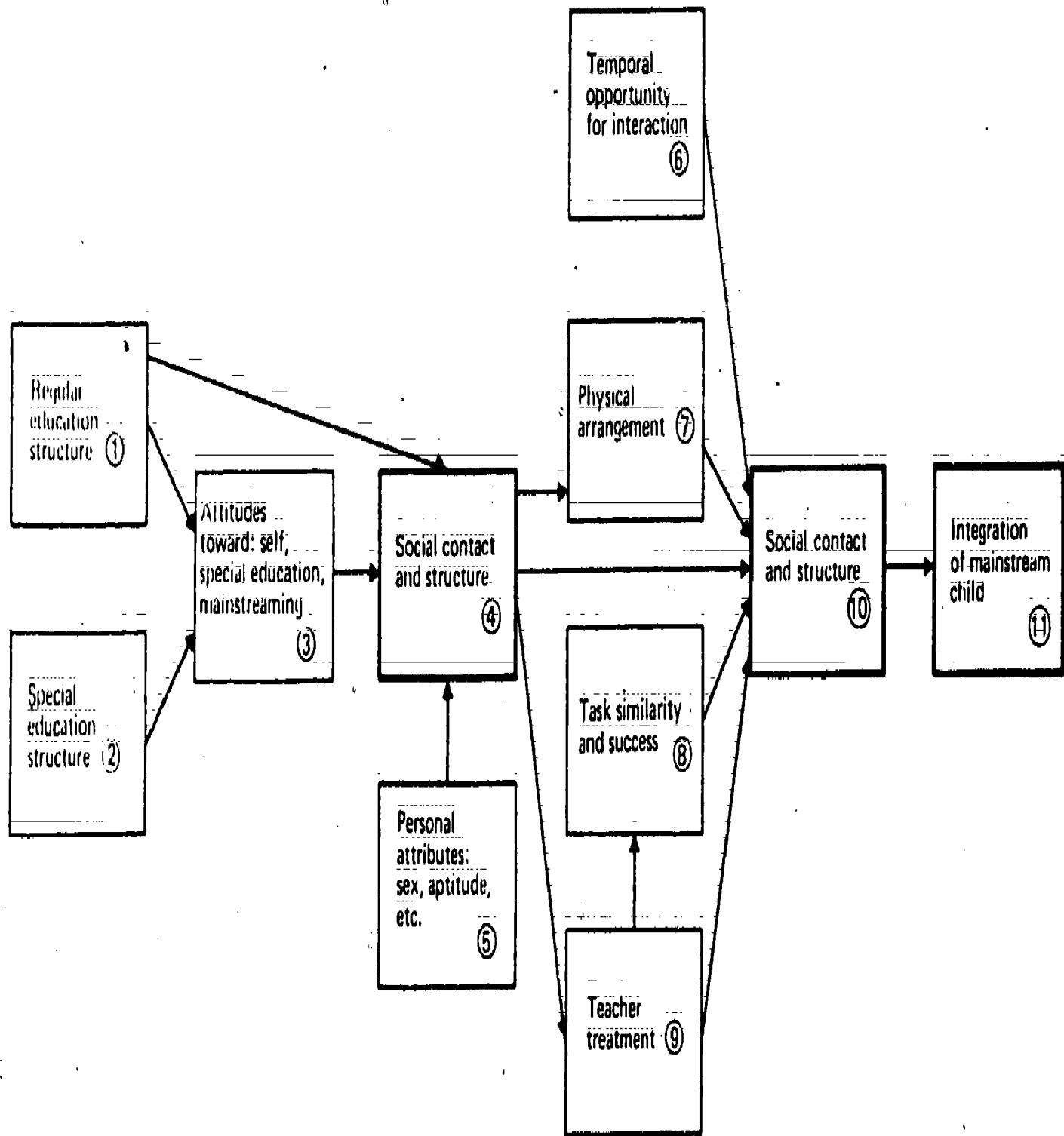
FIGURE 16.3. *This model shows processes influencing mainstreaming.*

In the model presented in Figure 16.3, the social integration of a target child
(11) is an immediate consequence of prior social contacts, both positive and
negative. and classroom social structure (10). Social structure is influenced by
five aspects of classroom activity. First the temporal opportunity for interaction
between the target child and his or her peers (6) can be measured simply by
using the amount of total time that they are together. (Obviously, more complex
estimates can be made by setting and subgroup.) Second, the physical
arrangement (7) can include an index of similarity (child has a desk, spacing is
no more or less isolated, etc.) and appropriateness. Third, task similarity and
performance (8) should include information on the similarity of the task, the
significance of it, the visability and success of performance, and the visability
and success of the product. Fourth, teacher treatment (9) should include
estimates of appropriateness, frequency of contact in important dimensions
such as academic versus managerial areas, compensating behaviors, and
rejection or isolating behaviors. These measures most certainly should not be
simple estimates of equality. Finally, initial or prior social structure (4) of the
total group is expected to influence the final or posttreatment structure of the
group.

Physical arrangements of space (7) and teacher treatment of all children (9)
are also influenced by the initial social structure of the group (4). Initial social
structure (4) is influenced by individual personal attributes (5) and by a large
collection of attitudes and internalized experiences (3). These attitudes include,
for example, attitudes toward handicaps, attitudes toward mainstreaming, and
feelings and information about group structure and one's own role in it. These
attitudes are in turn influenced by prior structure (1 and 2). One arrow, the one
from regular group structure to initial structure, remains undiscussed. We feel
that in many mainstreaming situations in which the special child is "dropped
into" an existing group, group structure influences the effect of mainstreaming.
The target child's previous experiences operate thorugh his or her attitudes,
only, rather than directly on structure.

DATA AND MEASUREMENT

The typical approach to the development of data on social outcomes involves
the administration of attitude surveys or other devices designed to determine the
sentiments or ideas individuals possess about various social groups. The
underlying assumption is, of course, that such attitudes influence behavior. But
there are several problems with this approach. First, the relationship between
attitudes and behavior is poorly understood. Second, it is demonstrably difficult
to change attitudes. Third, the focus of most social interventions is the
modification of behavior, not attitudes. If extant interpersonal ties and
interactions are the focus, then the data of interest must reflect this concern.

14

There are two options; one involves gathering data that represent observations of actual behavior. Unfortunately, this requires costly, time-consuming procedures possessing significant data summarization, analysis, and generalization problems. Although such procedures do yield an unmatched richness of detail and are exceptionally well-suited to providing a context-setting perspective, in most situations their defects outweigh their advantages. The second option is to focus on the network of interpersonal ties.

The procedure that seems ideally suited to the generation of data on interpersonal relations is sociometric testing. Originated by Moreno (1934), sociometric data are, relatively speaking, easily obtained, intuitively comprehensible, and possessed of a high degree of concept validity. In some respects, the sociometric instrument is simply a survey of attitudes. In contrast to a traditional attitude survey, however, it probes attitudes toward specific members of the target population, individuals who actually participate in the daily interactions that characterize integration. Further, these relational data taken together represent an observation on the social system; that is, they are the measures of interdependent ties that knit the group members together into a coherent social organization. The structural characteristics of these ties are of focal interest because they define the location of the individuals in the group's social system. Such characteristics cannot be observed in the isolated reports of the individuals because they are not properties of the individuals. They are patterns, not attributes, and can only be detected by examining the way the interpersonal relationships fit together. This is a critical point and requires some elaboration.

Clearly, the willingness of children of one category to cite children of another category as their friends can be thought of in and of itself as a relevant social outcome. But a deeper view focuses on consistent patterns of joint citation, that it, instances in which specific individuals in different categories cite one another as friends. Such outcomes are indications of the mutual trust and openness to communication regarded by Cohen and others as essential features of racial integration. Similarly, the willingness of mainstreamed children to cite normal children as friends is not relevant. Given the reality of a normal classroom, such an outcome is a foregone conclusion and, given the low density of special children in the classroom, their lack of attraction is also somewhat expected. An essential issue, however, is the establishment of mutual friendships by the mainstreamed child, that is, the development of patterns of systematic reciprocal involvement in the social network.

Sociometric data are relevant to these issues. Methods for collecting them are well known and their use in research on desegregation and mainstreaming is not novel. Most applications have, however, been methodologically constrained and are not easily generalized. Both the approach to data collection and the use of ineffective analytic procedures have been at fault (Holland and Leinhardt 1973). We propose an approach that derives from the notion of the opportunity

15

framework and exploits some new developments in the theory of stochastic digraphs.

Our approach characterizes the educational intervention as a mechanism for manipulating opportunities for contact to occur between individuals. The interactions that take place between individuals may provide them with new information, cause them to change their attitudes and expectations, or otherwise lead to a modification in how each perceives the other. Extant ties to other members of the group may, through felt structural imperatives, also influence what is felt to be the consequence of the interaction. Regardless of the mode of operation, the interaction results in a relationship between the interacting individuals and it is the relationship, not the interaction, which persists and conditions the prospects of future interactions given the opportunities that get presented.

What we are saying, in effect, is that individuals make choices about whom to spend their time with, whom to have as friends. They cannot interact with everyone all the time. They must choose between competing options given the opportunities that the classroom schedule and management structure provide. Interaction and observation can operate to modify their priorities and can lead them to reevaluate the benefits of repetitions. Programmatic interventions can change opportunities and make interaction more or less convenient, but the relationships that develop as a consequence of the experience will be the dominant future factor influencing voluntary social behavior given consistency in context.

The next step in developing this approach requires that we link it to a statistical procedure for modeling friendship choice that relates to relevant social outcomes and can be used with sociometric data. The difficulty in accomplishing this step rests in the unique features of relational data and our desire to focus on patterns of relations, not distributions of attributes. Recent advances in the development of stochastic models for relational data have solved many of the problems associated with the analysis of reciprocation in the structure of sociometric data. The statistical development detailed in Holland and Leinhardt (1981) is quite complex and, consequently, we will not repeat it here. In essence, the theory conceptualizes sociometric data as observations on a system of affective ties which result from a "choice process," one in which individuals allocate their choices to others in a probabilistic fashion, whereas biases act to increase or decrease the probability that choices will go to specific others over time (Holland and Leinhardt 1977a, 1977b, and 1977c). These biases can be based on individual attributes such as race or ethnicity, or on structural feature of the social system such as reciprocity and even transitivity.

In this approach, reciprocity is represented as a bias that acts to increase or decrease the chance that, once a choice is made, the chosen individual will reciprocate the choice. Although deriving from a dynamic view, the approach is

equally valid at the cross-sectional level. Here the reciprocity bias can be conceived of as an instantaneous force or effect. A positive reciprocity effect means that the observation of a choice of one individual by another increases the chance that, in the same data matrix, the chosen individual will be observed to reciprocate. Application to the cross-sectional case involves specifying a model that is a member of a family of exponential probability distributions defined on digraphs (square matrices containing entries that are either zeros or ones) and using an iterative algorithm to estimate the parameters of the model. (Programs for fitting these models are available from the authors.) It is important to understand that the method developed in Holland and Leinhardt (1981) is both multivariate and parametric. The multivariate feature means that the estimated effect of a bias like reciprocity is made conditional on the impact of other model-specified biases, including the attractiveness (sociometric status) or productivity (gregariousness) of each individual. The fact that the effects are estimates of the parameters of a model means that they can be compared across different samples and that the parameter values can be used as measures or data in secondary analyses.

The procedures that Holland and Leinhardt (1981) introduce permit analyses of important structural patterns in sociometric data. It is natural to ask how these statistical models can be used to evaluate the social outcomes of mainstreaming and desegregation. We pursue an application to mainstreaming in depth later. but first we discuss briefly and nontechnically how one might proceed.

The analytic framework permits the investigator to specify alternative statistical models for the sociometric data. Extensions permit disaggregating effects to suit the needs of a hypothesized social outcome. For example, an effect of desegregation might be specified in terms of altering the probability of reciprocal choice between different groups while having no impact on the chances of reciprocal choosing within each group. The situation is slightly modified in the mainstreaming situation since the groups here typically involve a single handicapped child and a large group of nonhandicapped children. If the behavior of the special child is the focus of an evaluative study, the analysis can examine whether, for example, the probability of a choice is going to the special child has increased given that there is a choice coming from the special child. It is the ability to specify the exact nature of the relational pattern and to estimate the effect that render this approach appealing.

DETAILED APPLICATION TO MAINSTREAMING DATA

We have used this analytic framework in evaluating the social outcomes of a mainstreaming experiment. This effort is still underway and the results we have to date are preliminary and limited. Nonetheless, we present them here as an

17

example of the way in which the opportunities framework and stochastic relational data analysis procedures can be employed in evaluative studies.

We have obtained sociometric data generated during an Office of Education-sponsored mainstreaming experiment called Project Prime which was performed in Texas. circa 1970 (Ballard, Corman. Gottlieb, Kaufman 1977). Project Prime took place over a period of 3 years and involved a series of separate studies. The particular research activity we are concerned with was designed to study the integration of mainstreamed educable mentally retarded (EMR) children. It has often been observed that mainstreamed EMR children experience deleterious social effects. Although they may have been socially integrated in their special education classrooms. within the mainstream classroom they experience affective rejection and social isolation (Corman and Gottlieb 1978). As in the case of desegregation, this voluntaristic resegregation suggests that the affected child might be academically and socially better off in a programmatically segregated classroom. Since the mainstreaming of EMR children usually involves placing only one or a small number of special children into regular classrooms, exploration of secondary interventions that would alleviate or eradicate the negative outcomes of mainstreaming would seem easily accomplished. Indeed, numerous strategies have been developed and implemented in the field. Unfortunately, there is little in reported analyses to suggest that the systematic isolation of mainstreamed EMR children by their classmates can be avoided.

The component of Project Prime with which we are concerned was designed to obtain conclusive evidence that secondary interventions could work. The research design used was that of a traditional experimental study. Approximately 40 elementary school classrooms, each containing one mainstreamed EMR child, were split into experimental and control groups. The experimental groups experienced a treatment in the form of a teacher-led group activity designed to increase the opportunities for encounters between the teacher. the special child. and the normal children. and to increase the opportunities for normal children to observe the special child successfully performing a socially important task.

It must be remembered that although the behavior of the mainstreamed child is expected to be affected by the interventions; it is the reactive behavior of the normal children that is the focus of the research. The objective is to get the normal children to accept the handicapped child, to view the handicapped child as much as possible in the same light as they view one another, and to motivate the development of reciprocity by stimulating normal children to respond to the attempts of the handicapped child to initiate interpersonal ties. In this particular context, it is explicitly recognized that the social position of the special child is a consequence of the normal children failing to accept the special child and make him or her a "regular" member of their social system.

18
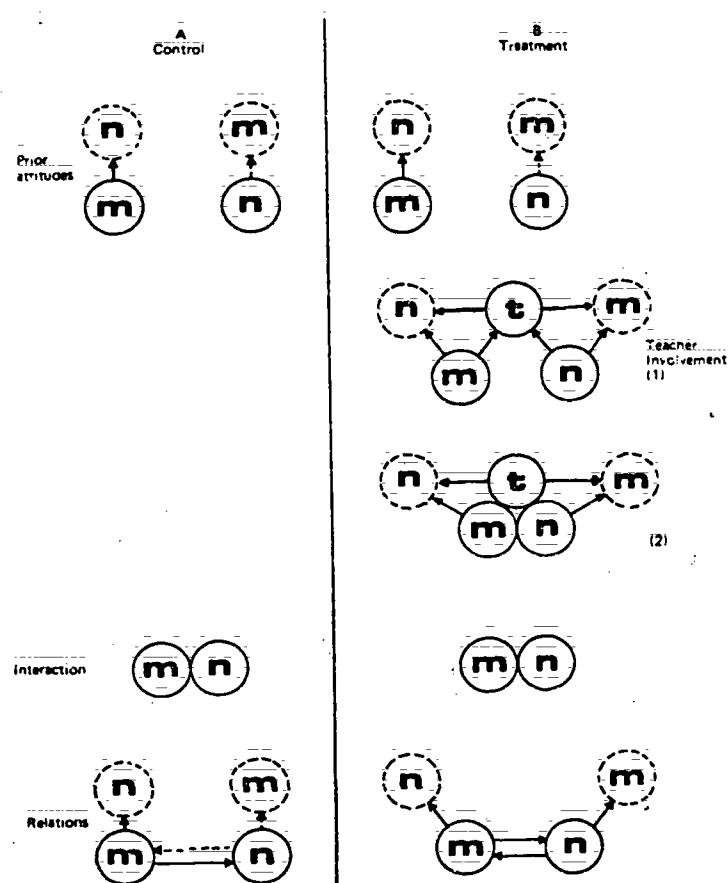
FIGURE 16.4. This is a diagram of the results of the Prime experiment.

Figure 16.4 presents the two processes diagrammatically. In the control situation. the usual social events occur. The normal child is thought to possess negative attitudes and expectations about EMR children. The mainstreamed child, on the other hand, is quite positively predisposed toward other children, handicapped or nonhandicapped. Mainstreaming creates opportunities for actual interaction. When encounters occur they confirm the children's preconceived notions. The children part, with the mainstreamed child liking the nonhandicapped child and wanting to engage in future interaction, whereas the nonhandicapped child rejects the mainstreamed child and prefers to avoid future interaction.

19

Under the treatment condition, the initial situation is identical. The teacher whom both like, however, steps in and, through management of a common activity, operates so as to alter the attitude of the nonhandicapped child and mediates the children's interaction. The experience is supposed to be positive. The result should be a change in attitude in the nonhandicapped child. This positive relationship is readily reciprocated and leads to future encounters which maintain the affective ties. Although not explicitly stated, the assumptions in this representation of the process seem to be those made by others who have studied the Project Prime data. The results that these investigators obtained, however, indicate that the treatment had no noticeable positive effect.

Detailed analyses of the Project Prime sociometric data will be reported elsewhere. We report here two general results. First, we investigate whe.her, empirically, there is any benefit accruing from the use of the multivariate stochastic procedure as opposed to a traditional univariate approach. Second, we present some results relevant to evaluating the impact of the experimental manipulation on the mainstreamed EMR children.

The traditional approach to the study of sociometric position focuses on "sociometric status" measured simply as the number of (or some normed function of) choices each group member attracts. Such measures are theoretically inadequate because they are, in effect, zero-order measurements and fail to control for the simultaneous impacts of other relevant features of the system of ties. It is, of course, one thing to have a theoretical rationale behind a complex alternative and another to demonstrate empirical differences in the measures, that is, to show that the simple measure and the complex measure give different results. For each group, we computed chi-square statistics for a hierarchy of models that included a univariate approach to the measurement of sociometric status and multivariate alternates that contained variables for group reciprocity and choice density, and individual productivity and attractiveness. First, the multivariate models that were fitted to the data were nearly always statistically significant indicating that a univariate analysis, such as is usually performed in the mainstreaming literature, was generally inadequate and would yield biased results. This finding suggests that prior reports of analyses, which found no effect for the experimental manipulation, would be erroneous.

We also contrasted the individual parameter estimates obtained under the multivariate approach with those obtained using a univariate approach. The multivariate parameter values ranged over a greater number of values than did those obtained using a univariate approach. One interpretation of this finding is that the multivariate approach makes finer, more precise distinctions between the structural features of the group members.

Finally, the individual parameter values for attractiveness (sociometric status) and productiveness (gregariousness) of ties obtained using the multivariate approach were plotted against those obtained from a univariate model.

These plots revealed that the multivariate parameters were not monotonic functions of the univariate estimates. This indicates that even simple conclusions drawn, say, on the basis of a rank ordering of the univariate effects would not necessarily be robust and should not be used to draw evaluative conclusions.

These three results taken together form a convincing argument for the use of the multivariate approach in developing measures of individual social outcomes that can be used to evaluate an intervention quantitatively. Indeed, on the basis of our admittedly limited empirical results, relying on a univariate statistic such as "sociometric status" (or any simple version of this statistic) as an indicator of social integration or interpersonal attractiveness is dangerous. In the case of the Project Prime data, it is clear that such reliance would lead to incorrect conclusions. In a recent report in fact, researchers using univariate measures concluded that the Project Prime manipulation had no effect (Semmel, Gottlieb, and Robinson 1979). As we will show, however, an effect can be associated with the experimental manipulation. We discuss this result next.

We evaluated the effectiveness of the experimental manipulation in the following way. One of the planned objectives of the manipulation was to improve the social integration of the mainstreamed child. The opportunities framework led us to conceptualize this process as a potential influence on the attractiveness of the mainstreamed child and as an agent modifying the reciprocal nature of the social relations among mainstreamed and regular children. Here we report results that focus on attraction.

A full multivariate model was fitted to each sociomatrix. This produced parameter estimates for overall reciprocity and density, and individual production and attraction of ties. We extracted the estimates of the individual attraction parameters for each mainstreamed EMR child. We then used least-squares regression to estimate an equation in which posttreatment attraction of the EMR child was regressed on their pretreatment attraction, their gender, and the kind of treatment (experimental or control) they experienced. Thus, the estimated model was:

$$\text{attraction (post)} = \text{attraction (pre)} + \text{treatment} + \text{gender.}$$

This is, in effect, a covariance adjusted analysis in which pretreatment attraction is controlled. Gender was included because male and female EMR children are often treated differentially. We hasten to point out that the attraction measures are the parameter estimates obtained by fitting a multivariate model to each data matrix. Thus each individual EMR child's attractiveness parameter is adjusted for the structure of the group he or she was in. In terms of the evaluative model we proposed earlier, only the social structure (pre- and post-) and personal attributes were observed; whereas the

indicator variable for treatment can be thought of as a surrogate for temporal opportunity and task.

The regression obtained an adjusted r^2 of .26 using 28 observations. The coefficients for pretreatment attraction, treatment, and gender were .78, .83, and .94, respectively, with t-statistics of 3.13, 1.79, and 1.86. We are concerned primarily with the results for treatment since we view pretreatment attraction and gender as nuisance parameters. The finding of a positive effect for treatment with a t-statistic of 1.79 lends support to the hypothesis that the treatment did have a beneficial impact on the average net attractiveness of the EMR children. Since the treatment variable appears in the analysis as a 0/1 indicator variable, when the child is in a control group, posttreatment attraction appears to depend on pretreatment attraction and gender. Being in the treatment group gives an additional boost to the child's attraction.

Concluding Remarks

In this chapter we have proposed a conceptual framework that focuses attention on how interventions alter opportunities for interaction. We also proposed a methodology, involving the observation of social activities, which we believe can help make distinctions between social and academic outcomes of educational innovations clearer. We have argued that social relationship data is an especially useful means of obtaining information on the effects of social processes that are involved in educational interventions. Past problems in the analysis of relational data seem to have been solved and newly available techniques allow investigators to obtain empirical estimates of structural parameters in multivariate models. This results in significantly improved precision and validity of measurement. Using data from a mainstreaming experiment, we showed that this approach was essential in evaluating treatment effectiveness and demonstrated how conceptual models of programmatically altered opportunities could lead to a focus on specific outcomes that, in turn, could be associated with particular parameters of a stochastic structural model.

We have tried to capitalize on some of the advances that have been made in the area of evaluating academic outcomes and bring them to bear on the problem of evaluating social interventions. We have argued that a useful evaluation needs to have a clear focus on at least one valued outcome and that that outcome should be measureable. For the social interventions described, we offer the pattern of social relations as a reasonable outcome and sociometric data as a useful way of measuring that outcome. We have also argued that the policy analysis and evaluative dialogues are greatly enhanced by making explicit the underlying causal schema through which an intervention is presumed to operate. It is the evaluator's responsibility to develop such a

schema and we suggest that evaluators can combine their knowledge of social science with an opportunities framework in order to produce such a schema.

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23

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24

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